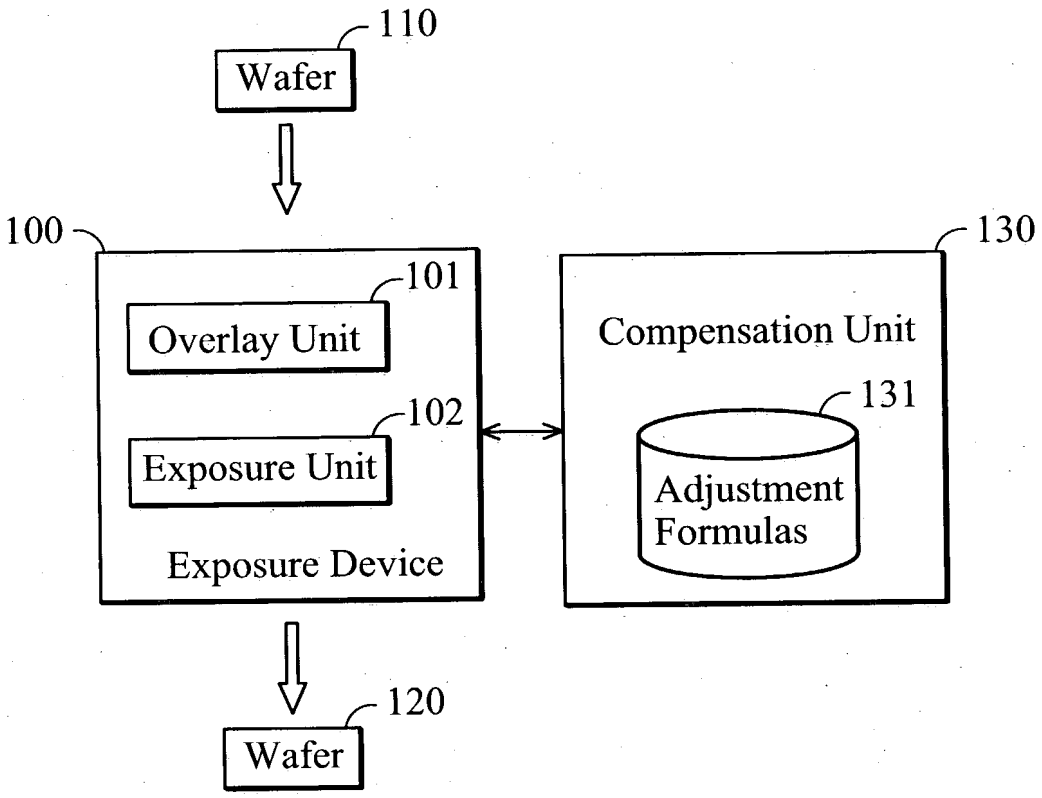
110
Wafer
100
130
101
Overlay Unit
Compensation Unit
131
102
Exposure Unit
Adjustment
Formulas
Exposure Device
120
Wafer

FIG. 1

200

Equipment Parameter	Overlay Parameter	Adjustment Formula
FIA _ X (um)	Offset_X(um)	B = -1.0883*A - 0.0016
FIA _ Y (um)	Offset_Y(um)	B = -1.0232*A - 0.0023
Lens Mag Matching Offset X (um)	Shot Scaling X (ppm)	B = -84.853*A + 0.0639
Machine Scaling Y (ppm)	Shot Scaling Y (ppm)	B = -1.0053*A - 0.0193
LSA _ X (um)	Offset_X (um)	B = -0.9958*A + 0.0011
LSA _ Y (um)	Offset_Y (um)	B = -1.0042*A - 0.0004
Shot Skew(urad)	Shot Ortho(urad)	B = -0.9422*A + 0.0094
Machine Shot Rot(urad)	Shot Rot(urad)	B = -1.0247*A - 0.0214

FIG. 2

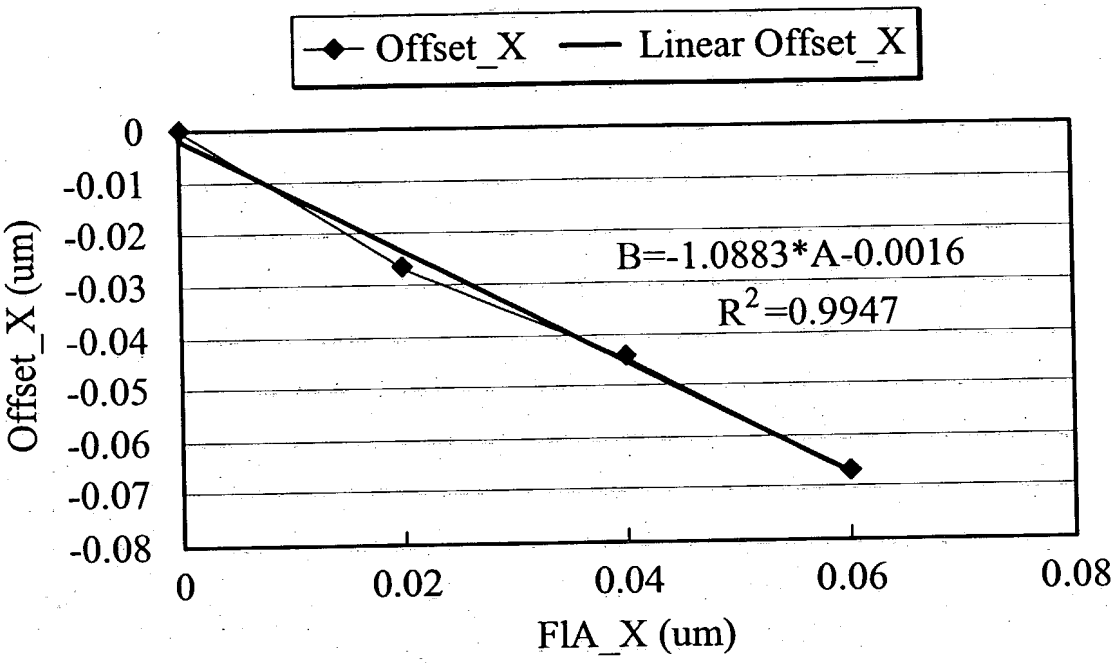
Offset_X
Linear Offset_X
0
-0.01
-0.02
-0.03
-0.04
-0.05
-0.06
-0.07
-0.08
Offset_X (um)
B=-1.0883*A-0.0016
R2=0.9947
0
0.02
0.04
0.06
0.08
FlA_X (um)

FIG. 3A

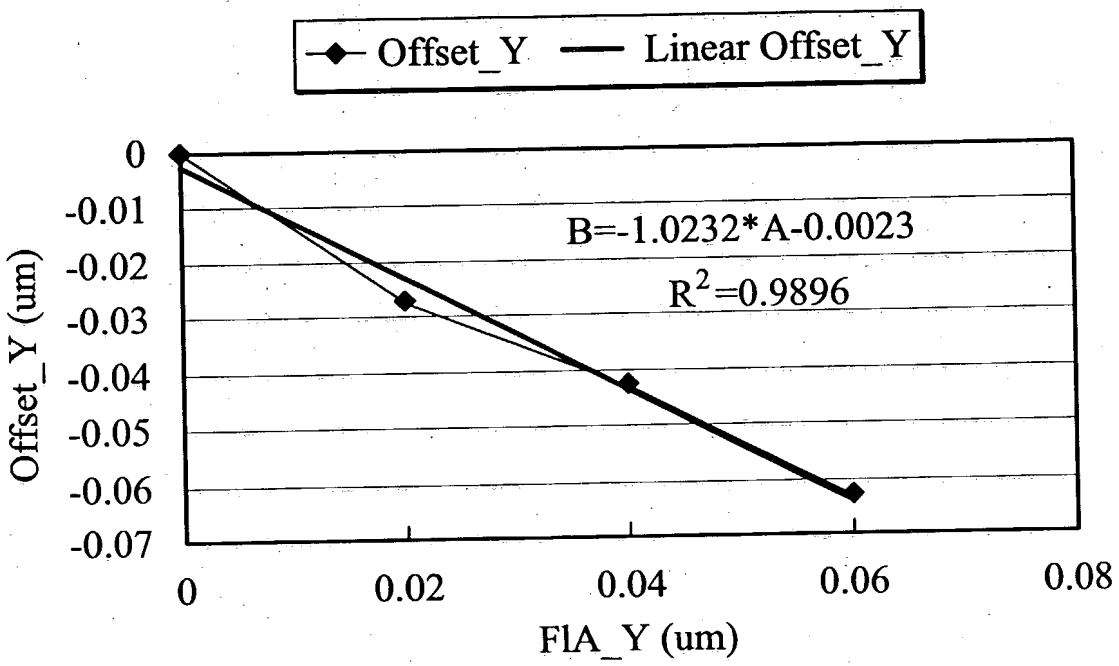
Offset_Y
Linear Offset_Y
0
-0.01
-0.02
-0.03
-0.04
-0.05
-0.06
-0.07
Offset_Y (um)
B=-1.0232*A-0.0023
R2=0.9896
0
0.02
0.04
0.06
0.08
FlA_Y (um)

FIG. 3B

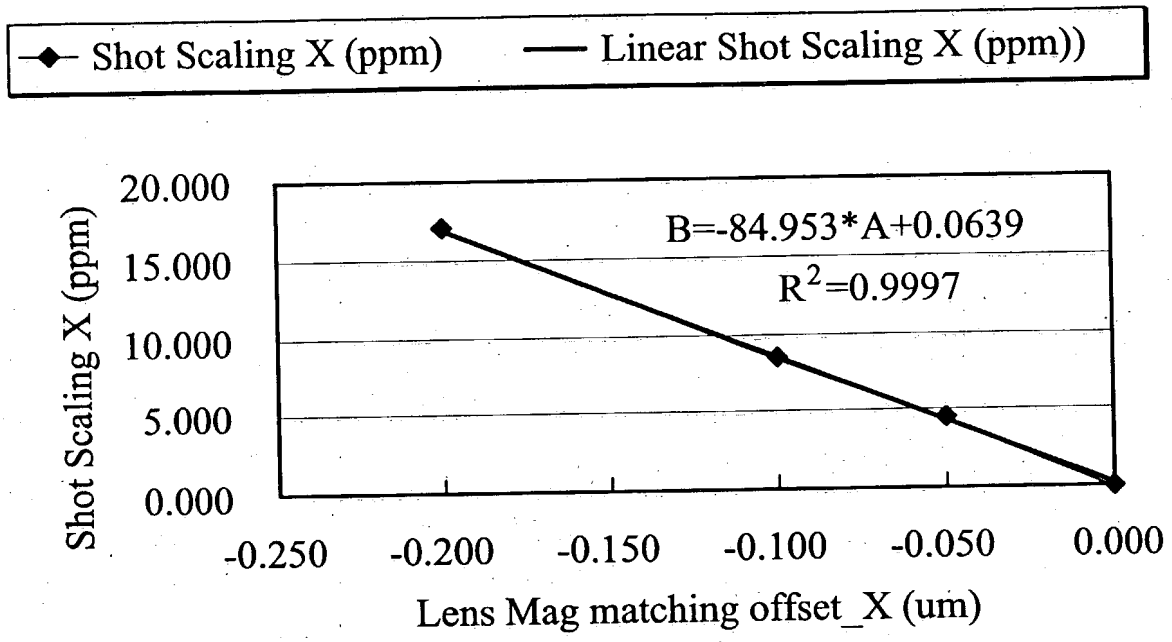
Shot Scaling X (ppm)
Linear Shot Scaling X (ppm))
Shot Scaling X (ppm)
20.000
15.000
10.000
5.000
0.000
B=-84.953*A+0.0639
R2=0.9997
-0.250
-0.200
-0.150
-0.100
-0.050
0.000
Lens Mag matching offset_X (um)

FIG. 3C

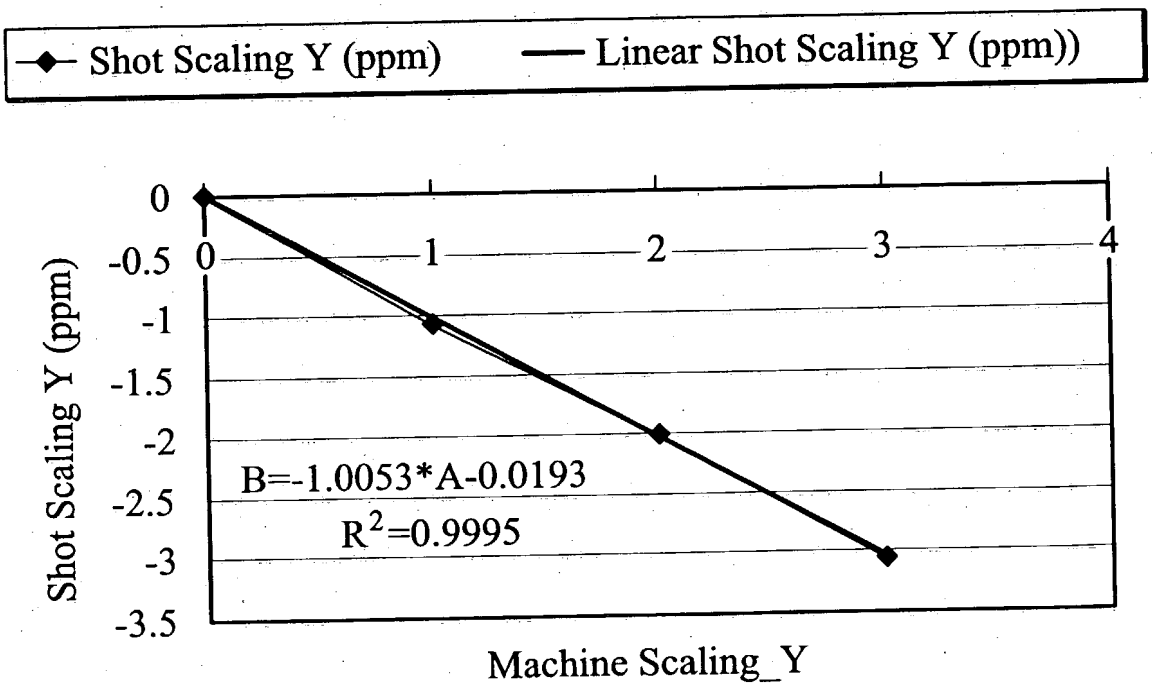
Shot Scaling Y (ppm)
Linear Shot Scaling Y (ppm))
Shot Scaling Y (ppm)
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
0
1
2
3
4
B=-1.0053*A-0.0193
R2=0.9995
Machine Scaling_Y

FIG. 3D

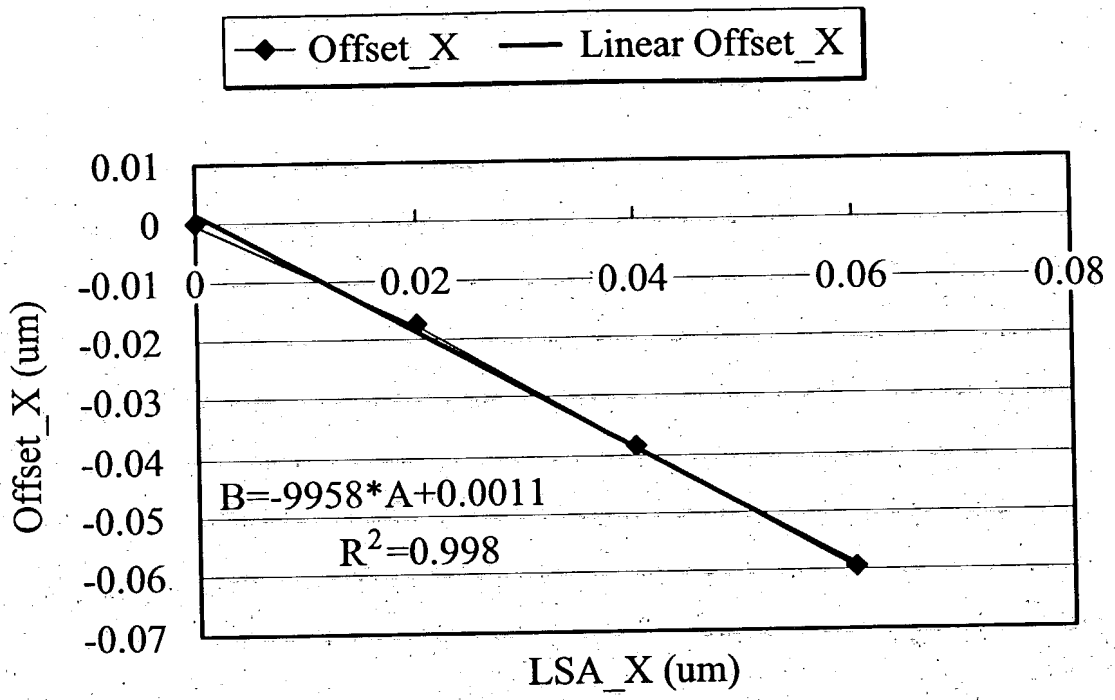
Offset_X
Linear Offset_X
0.01
0
-0.01
-0.02
-0.03
-0.04
-0.05
-0.06
-0.07
0
0.02
0.04
0.06
0.08
Offset_X (um)
B=-9958*A+0.0011
R2=0.998
LSA_X (um)

FIG. 3E

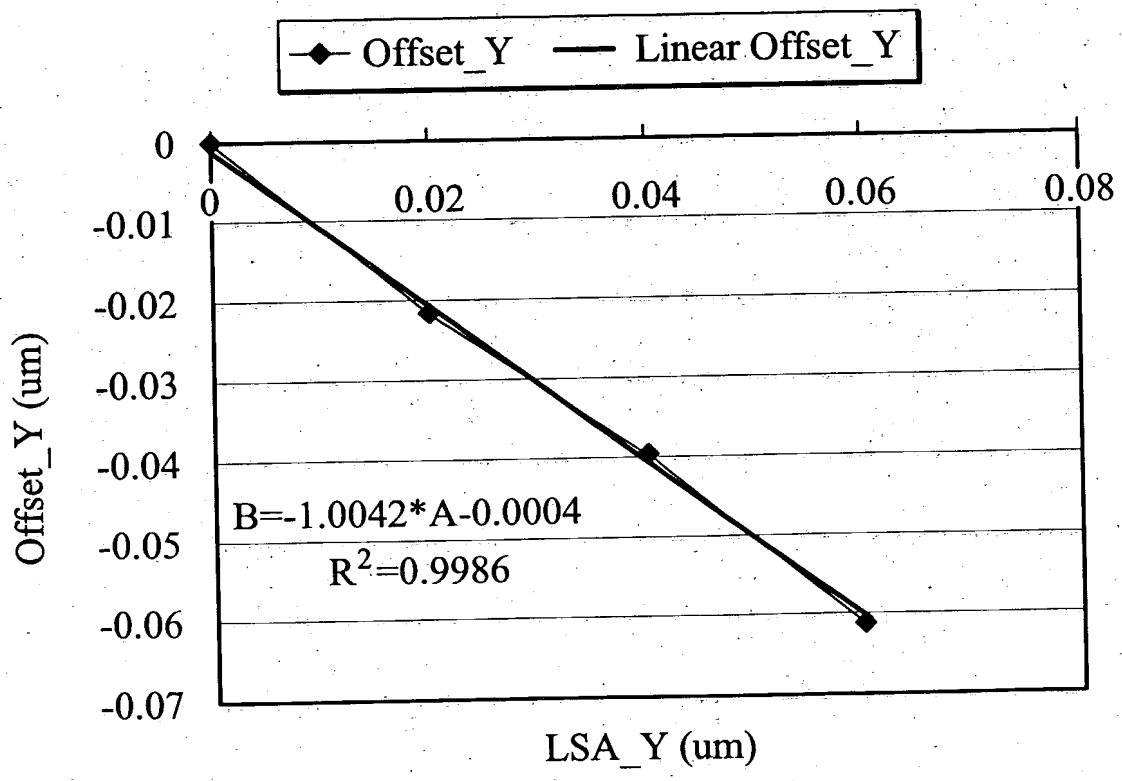
Offset_Y
Linear Offset_Y
0
-0.01
-0.02
-0.03
-0.04
-0.05
-0.06
-0.07
0
0.02
0.04
0.06
0.08
Offset_Y (um)
B=-1.0042*A-0.0004
R2=0.9986
LSA_Y (um)

FIG. 3F

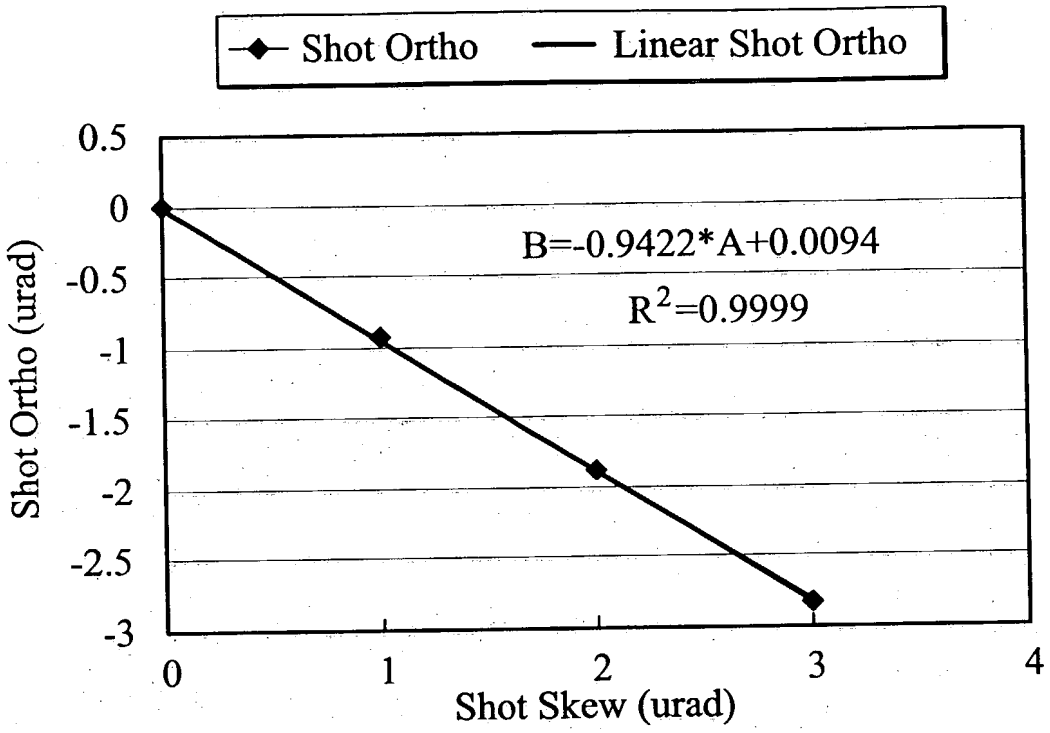
Shot Ortho
Linear Shot Ortho
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
Shot Ortho (urad)
B=-0.9422*A+0.0094
R2=0.9999
0
1
2
3
4
Shot Skew (urad)

FIG. 3G

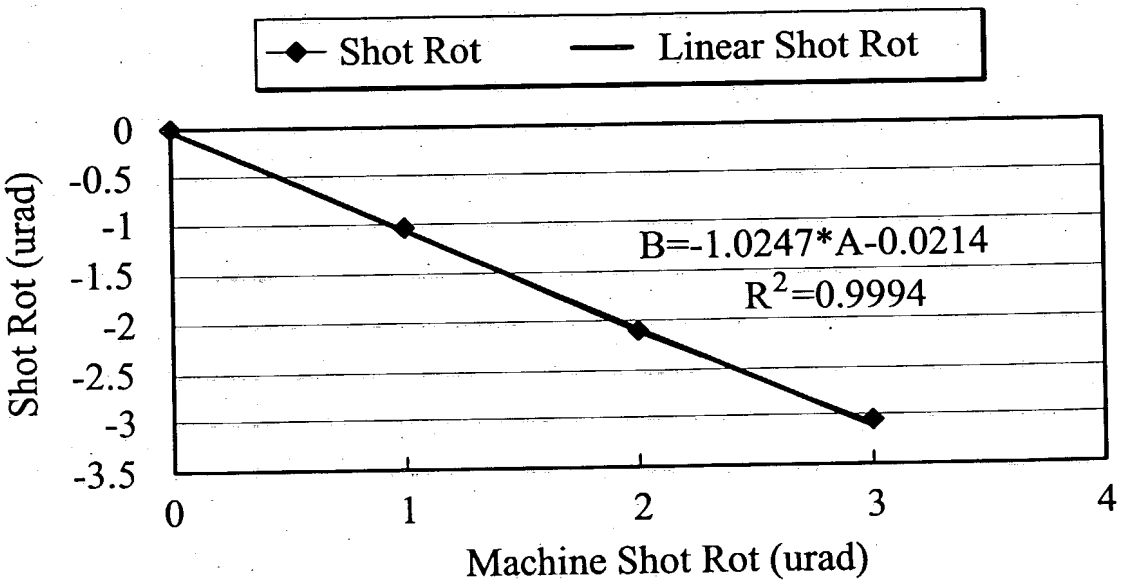
Shot Rot
Linear Shot Rot
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
Shot Rot (urad)
B=-1.0247*A-0.0214
R2=0.9994
0
1
2
3
4
Machine Shot Rot (urad)

FIG. 3H

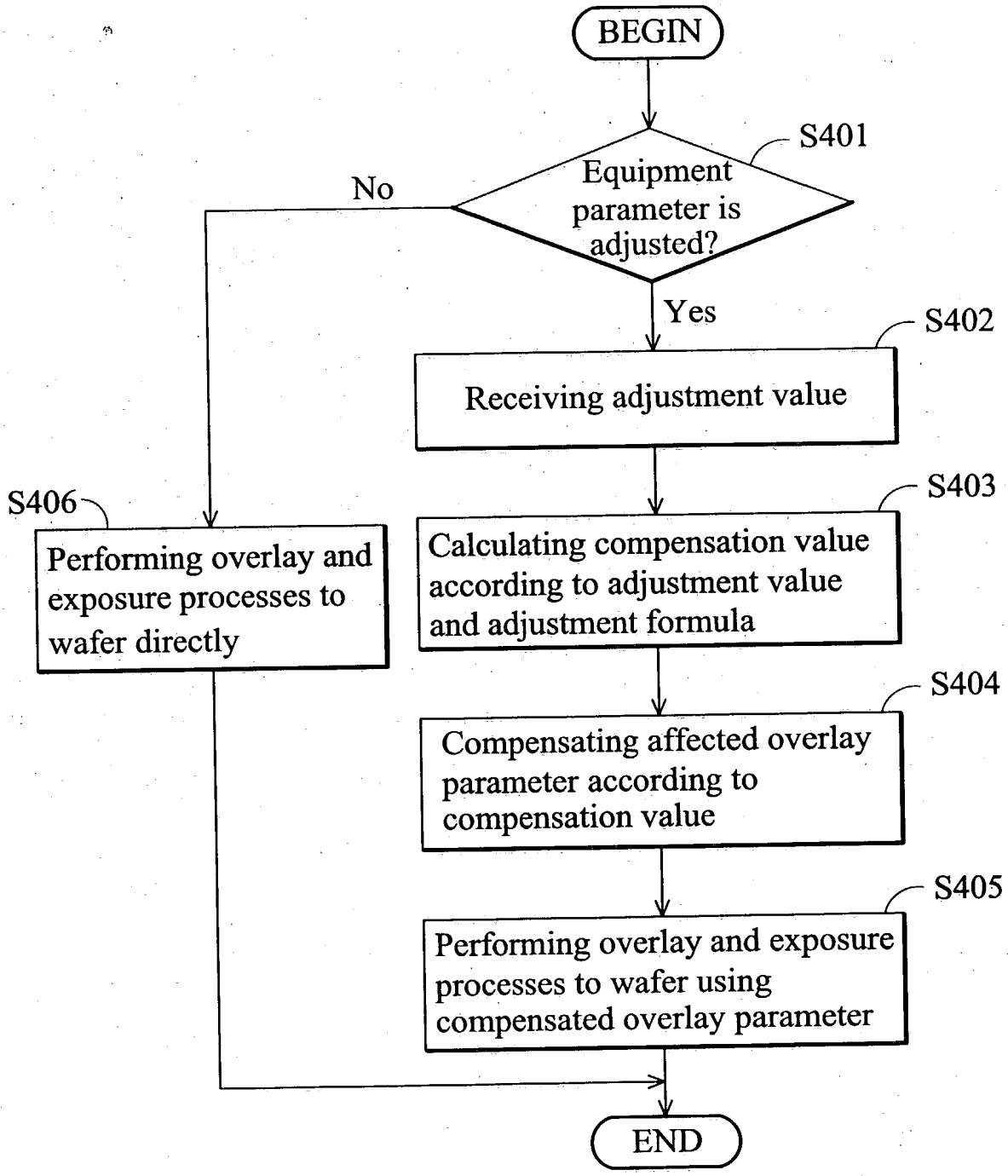
BEGIN
S401
Equipment parameter is adjusted?
No
Yes
S402
Receiving adjustment value
S403
Calculating compensation value according to adjustment value and adjustment formula
S404
Compensating affected overlay parameter according to compensation value
S405
Performing overlay and exposure processes to wafer using compensated overlay parameter
S406
Performing overlay and exposure processes to wafer directly
END

FIG. 4